
Appendix C

Descriptions for Priority Stream Segments

BER Priority Stream Segments Within or Tributary to the Lower Wolf River Bottomlands Natural Resources Area

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1. Wolf River Corridor – Shawano to CTH CCC

Ecological Landscape: Northern Lake Michigan Coastal
Town-Range-Section: T27N-R 15E sec. 36; T26N-R 16E sec. 06-08, 16-17, 20, 29
River-miles: 10

Site Description

This Stream Segment includes a 10-mile stretch of the Wolf River beginning at the dam in Shawano and continuing downstream to CTH CCC north of Navarino SWA in eastern Shawano County. This segment is distinct in character from the remaining 90+ river-miles of the Wolf beginning immediately downstream (site # 2). The reason for the difference in this section of river from that downstream is the presence of a transition from the glacial moraine and till in the north to the sandy outwash and glacial lake bed deposits in the south. This section of river has a relatively narrow floodplain and few off-channel aquatic habitats such as sloughs, oxbows, and backwaters. The river here is 50 m to 75 m wide with a mean thalweg depth of 1-2 m (Lyons, unpublished data). A few deep riffles and shallow fast runs are present. Bottom substrates are predominately sand and gravel with areas of cobble and some boulders. Extensive macrophyte beds develop in the summer in some shallow areas. Abundance of large woody debris in the channel is low to moderate. Rock rip-rap is uncommon.

Below Shawano, riverside residences are currently uncommon, but there is potential for heavy future development. This portion of the river has been subjected to a number of disturbances including the dam at Shawano, construction of three bridges, paper mill and sewage treatment effluent, urban run-off, and, most recently, a bentonite leak from a pipeline drilling project. Another pipeline and powerline also cross the river in this segment.

The shoreline is mainly upland shrubs and forest. The associated small patches of floodplain forest are composed of silver maple, bur oak, and green ash. The condition of these patches is variable, based on past disturbance and recovery. Red maple and white cedar are mixed in with this forest community at the northern end of the site. A fringe of silver maple lines the riverbank. Several small patches of open, often disturbed wetlands occur and are dominated by reed canary grass, willow, bulrush, nettle, alder, and sedge. Steeper riverside slopes support narrow strips of relatively undisturbed mesic forest of hemlock, white pine, red oak, sugar maple, basswood, and yellow birch.

Site Significance

This segment is the uppermost 10 miles of one of the longest unimpounded warmwater river reaches remaining in the Midwestern United States. The abundant gravel and cobble substrate here supports good populations of several aquatic animals including 20 mussel species, 109 aquatic insect and crustacean species, and at least 55 species of fish. Several of these taxa are either much less common or absent downstream.

There is an excellent diversity of Endangered, Threatened, or Special Concern aquatic animals here including two true bugs, six dragonflies, four fish, two stoneflies, one mayfly, six mussels, and one turtle. Eight of these species are globally rare and eight are state Threatened or Endangered. The shoal chub (formerly speckled chub) population here is the only one known in the Great Lakes basin (Lyons et al., 2000). There are several important mussel beds in rocky-gravelly sections of this stretch of the Wolf River as well, especially immediately below the dam

in Shawano where one of the best populations of the globally imperiled snuffbox is found. More on the fish diversity of this segment is addressed in the priority stream site 2 description below.

Two different portions of this segment feature relatively high sandy banks that are important nesting sites for kingfishers, bank and rough-winged swallows, and riverine turtles including the Threatened wood turtle. Both areas are significantly degraded by human activities but are restorable.

This section of stream was identified by The Nature Conservancy as a site of ecoregional significance, meaning conservation activities will be initiated by The Nature Conservancy to ensure protection of the diversity of aquatic species found here. The segment was one of five such sites identified by The Nature Conservancy as aquatic conservation priorities within the Wolf River basin (see Map 1). These TNC Sites were considered the best remaining examples of aquatic features within the ecological drainage unit, based on the large number of aquatic animals (especially rare species) found here. See Part 1 of this report for a description of TNC's Ecoregional Planning Process (The Nature Conservancy, 2000).

Management Considerations

While there were a number of known past perturbations affecting this section of river, field surveys for this project noted relatively few factors potentially affecting water quality. Occasional turbidity, sludge, urban, and point source problems were noted, mostly all at the sample site in Shawano (Appendix E.3). Additional management considerations are touched on in the site description above. The conservation of the natural values here will depend upon the protection of the water quality including the physical river corridor and adjacent uplands. This section of river has a number of obvious factors compromising stream integrity. While the overall level of development is low presently downstream of Shawano, the high amount of upland shoreline and the lack of public ownership suggest a high potential for future residential development.

WOLF RIVER CORRIDOR # 1 AQUATIC ANIMAL EO's

Wolf River (Shawano dam to CTH CCC)

Common Name	Scientific Name	Last Observation	US ESA Status	State Status	Group name
A creeping water bug	<i>Pelocoris femorata</i>	1999		SC/N	BUG^
A velvet waterbug	<i>Hebrus burmeisteri</i>	1999		SC/N	BUG^
Dark rubyspot	<i>Hetaerina titia</i>	1999		SC/N	DRAGONFLY^
Elusive clubtail	<i>Stylurus notatus</i>	1999		SC/N	DRAGONFLY^
Green-faced clubtail	<i>Gomphus viridifrons</i>	1999		SC/N	DRAGONFLY^
Pygmy snaketail	<i>Ophiogomphus howei</i>	1999		THR	DRAGONFLY^
Skillet clubtail	<i>Gomphurus ventricosus</i>	1999		SC/N	DRAGONFLY^
Stygian shadowfly	<i>Neurocordulia yamaskanensis</i>	1999		SC/N	DRAGONFLY^
Lake sturgeon	<i>Acipenser fulvescens</i>	2000		SC/H	FISH^
River redhorse	<i>Moxostoma carinatum</i>	1982		THR	FISH^
Shoal chub	<i>Macrhybopsis aestivalis</i>	2000		THR	FISH^
Western sand darter	<i>Etheostoma clarum</i>	2000		SC/N	FISH^
A Perlid stonefly	<i>Isoperla bilineata</i>	1999		SC/N	INSECT^
A Perlid stonefly	<i>Isoperla richardsoni</i>	1999		SC/N	INSECT^
A small minnow mayfly	<i>Paracloeodes minutus</i>	1992		SC/N	MAYFLY^
Buckhorn	<i>Tritogonia verrucosa</i>	1995		THR	MUSSEL^
Elktoe	<i>Alasmodonta marginata</i>	1989		SC/H	MUSSEL^

Wolf River (Shawano dam to CTH CCC)

Common Name	Scientific Name	Last Observation	US ESA Status	State Status	Group name
Round pigtoe	<i>Pleurobema sintoxia</i>	1991		SC/H	MUSSEL^
Salamander mussel	<i>Simpsonaias ambigua</i>	1992		THR	MUSSEL^
Slippershell mussel	<i>Alasmidonta viridis</i>	1991		THR	MUSSEL^
Snuffbox	<i>Epioblasma triquetra</i>	1995		END	MUSSEL^
Wood turtle	<i>Clemmys insculpta</i>	1987		THR	TURTLE^

2. Wolf River Corridor – CTH CCC to Lake Poygan

Ecological Landscapes:	Central Lake Michigan Coastal, Southeastern Glacial Plain
Town-Range:	T20N-R 14E; T21N-R 13-14E; T22N-R 13-16E; T23N-R 16E; T24N -R16E; T25N-R 15-16E; T26N-R 16E
River Miles:	about 91

Site Description

This Stream Segment includes about 91 river-miles of the Wolf River beginning at the CTH CCC bridge and continuing downstream to Lake Poygan in Winnebago County. Compared to site 1 upstream, this stretch flows through a much wider and largely intact floodplain with extensive off-channel habitats. This long river segment overlaps a number of terrestrial sites also identified in this report Appendix B (Sites 1, 2, 6, 7, 8, 12, 13, 14, 15, 16, 17, and 20).

From 10 to 75 miles below the Shawano dam, the river is typically 25-50 m wide with mean thalweg depths of 2-4m. Riffles are absent and shallow fast runs scarce, although occasional mid-channel, shallow, sand “flats” are present. Bottom substrates are sand, silt, and clay, and naturally occurring rock is rare. Macrophytes are common in off-channel habitats but uncommon in the main-channel. Large woody debris is common in both main- and off-channel habitats. The shoreline is mainly swamp with sand/clay banks, but the outside of many bends has been stabilized with boulder rip-rap, especially near towns, bridges, and fishing rafts.

For the last 25 river miles, beginning just below the mouth of the Little Wolf River, the river widens to 70-80 m and remains 2-4 m deep. Several large side channels with significant flow are present (e.g., Big Cut, Mill Cut) and there are two small and shallow main channel lakes (Partridge and Partridge Crop). Silt and clay substrate dominates, but some sand is present. Macrophytes and large woody debris are common in both main and off-channel habitats. Extensive silver maple-dominated floodplain forest covers much of the area. The shore is bordered by a mix of swamp forest and open marsh, with marsh predominating in the last 10 miles. Many banks have been stabilized with rip-rap. Topography is nearly level with a gentle slope to the south. The Wolf River Valley is up to five miles wide at this location, and the river meanders in a maze of sloughs, oxbows, channels, and shallow lakes. The adjacent uplands are used for agriculture and low-density residential development. No bridges exist along this section of the river. Small fishing rafts, moored along the riverbanks, are a common feature.

Overall, areas of quiet water, including lakes, sloughs, oxbows, and stagnant areas in channels support submergent aquatics such as water celery, spatterdock, water weed, water milfoil, pondweed, and hornwort. Open emergent wetlands along the river, and larger inland wetlands, consist of cattail, reed canary grass, bulrush, wild rice, willow, burreed, nettle, giant reed, and arrowhead. The southern end of Partridge Lake is heavily developed. The exotic flowering rush and purple loosestrife are established in some areas.

Site Significance

This segment plus the 10 river-miles immediately upstream (Stream Segment 1) comprises one of the longest un-impounded warmwater river reaches remaining in the Midwestern United States. The wide diversity of aquatic habitats found here supports an excellent fauna including 148 insects and crustaceans, 23 mussels, and about 61 fish species. The big river habitat here supports several animals that are otherwise rare or absent in the WI portion of the Lake Michigan basin

including the Mississippi grass shrimp, elusive clubtail dragonfly, plains clubtail dragonfly, and snuffbox mussel, plus several fish species discussed below.

As with the section immediately upstream, there is an excellent diversity of Endangered, Threatened, or Special Concern aquatic species here including ten beetles, six true bugs, two caddisflies, two crustaceans, five dragonflies, seven fish, six mayflies, five mussels, and one turtle. Six of these species are globally rare, and many are restricted to relatively intact larger warmwater streams.

This segment and the one upstream support a diverse overall fish fauna. Sixty-nine species have been found between Shawano and Lake Poygan. Most of these species are native inhabitants of the river, but some like the brassy minnow are likely present in the river only as strays from small tributaries and others such as the muskellunge have been introduced. The origin of 10 species – shortnose gar, gizzard shad, speckled chub, river shiner, channel shiner, pugnose minnow, bullhead minnow, western sand darter, slenderhead darter, and river darter – is unclear. All are characteristic of large rivers in the Mississippi River basin but have distributions in the Lake Michigan basin that are essentially limited to the Fox-Wolf River drainage (in some cases also including lower Green Bay or its tributary the Menominee River; Lyons et al., 2000). There are a few mussel species with a similar distribution pattern (Mathiak, 1979). Becker (1976, 1983) suggested that at least some of these fish species may be non-native to the Fox-Wolf system, having perhaps invaded the Lake Michigan basin from the Mississippi River basin only recently via a canal built in the 1800's between the Wisconsin River (Mississippi basin) and the upper Fox River at Portage. However, a regular flood connection between the Wisconsin and Fox rivers at Portage prior to construction of the canal provided a ready mechanism for natural colonization of these and other fishes from the Mississippi basin over the last several thousand years, making them possibly native to the lower Wolf (Becker, 1983; Lyons et al., 2000).

The rich diversity of the fish fauna and the presence of at least seven rare fishes indicate that the Lower Wolf has great ichthyological value above and beyond its fisheries. Conservation of the rare fishes is particularly important. As mentioned, the lower Wolf River speckled chub population is the only one of its kind in the entire Great Lakes basin. The only Great Lakes basin populations of the western sand darter occur in the Wolf, Embarrass, Waupaca, and Menominee rivers (Lyons et al., 2000). Of these four, the lower Wolf River appears to support the largest number of individuals (Lyons, unpublished data). The lake sturgeon occurs throughout the Great Lakes basin, but the Wolf River likely has the greatest reproduction of any river in the basin (Folz and Myers 1985). The pugnose minnow has been reported from the Lake Michigan basin only from the Fox-Wolf River drainage and from Wolf Lake in northeastern Illinois, where it no longer occurs (Becker, 1976). Becker (1976, 1983) believed river redhorse to be extirpated from the Lake Michigan basin, but recent surveys confirm their presence in the lower Wolf (Fago, 1992; Lyons et al., 2000; Appendix J), and Fox (Lyons et al., 2000) rivers in Wisconsin. The channel shiner, although not rare in the Mississippi basin of Wisconsin (Lyons et al., 2000), has its only population in the entire Great Lakes basin in the lower Wolf River. Earlier surveys (e.g., Fago, 1992) may have confused channel shiners in the lower Wolf with the very similar mimic shiner, which also occurs there. See Appendix J for a more complete discussion of the fish fauna.

At least seven different areas in this segment feature relatively high sandy banks which are important nesting sites for kingfishers, bank and rough-winged swallows and riverine turtles including the Threatened wood turtle. Condition of these banks varies, but they all are restorable to functional quality.

This section of stream and site 1 together were identified by The Nature Conservancy as an aquatic priority conservation site, meaning conservation activities will be initiated by The Nature Conservancy to ensure protection of the diversity of aquatic species found here. The segment was one of five such sites identified by The Nature Conservancy (The Nature Conservancy, 2000) as aquatic conservation priorities within the Wolf River basin. These TNC Sites were considered the best example of that type within the ecological drainage unit. This was based on the large number of aquatic animals, especially rare species, found here (The Nature Conservancy, 2000).

Management Considerations

Field surveyors noted a number of factors potentially affecting water quality in this section of river (see Appendix E.3. for a complete list). Some 24 sites were sampled in this segment and bank erosion was noted as significant at 13 sites, turbidity at 11, and silt at 7. Also noted as significant were septic effluent (4 sites), urban runoff (6 sites), and point source pollution (2 sites). The area around CTH X stands out in having five different factors with potential to significantly affect water quality. As with the segment immediately upstream, the conservation of natural features here will depend upon the protection of the river corridor and adjacent uplands. This section of the lower Wolf corridor includes some excellent natural communities, very few bridges, and low development potential. Agricultural runoff and future development should be addressed.

The prevalence of rip-rapping in this segment is a concern in several regards. Fish assemblage quality, as measured by the IBI, scored consistently lower on rip-rapped sites than other sites. Also, rip-rapping tends to be placed on eroding sandy banks which are becoming a scarce habitat on the lower Wolf. Nesting river turtles and bank burrowing birds rely on these sandy banks.

Another concern is the high volume of boat traffic and the impact on turtles attempting to bask. Turtles likely suffer stress from repeatedly being frightened from their basking logs (an essential nutritional behavior) and may be struck by watercraft. Also the wake from these craft alters shoreline microhabitats that are important for amphibious animals.

Eventually these rip-rapped shorelines will alter the dynamics of river morphology. Many wetland alterations such as ditching and diking have taken place in the floodplain of this section of river. Habitat specialists, including big river, backwater, extensive forest and extensive marsh species, warrant special attention here. Invasive species are a significant problem in some areas and should also receive attention.

Also of concern here is the presence of numerous semi-permanently moored fishing rafts along the shore. These provide the ability for occupants to inhabit riparian shorelines that would otherwise be off limit to human habitation. A number of management concerns are presented by the presence of these structures.

Wolf River Corridor # 2 Aquatic Animal EO's

Wolf River (CTH CCC to Lake Poygan)

Common Name	Scientific Name	Last Observation	US ESA Status	State Status	Group name
a water scavenging beetle	<i>Hydrochara spangleri</i>	2000		SC/N	BEETLE^
a Dubiraphia riffle beetle	<i>Dubiraphia bivittata</i>	2000		SC/N	BEETLE^
a predaceous diving beetle	<i>Agabates acuductus</i>	2000		SC/N	BEETLE^
a predaceous diving beetle	<i>Lioporeus triangularis</i>	1999		SC/N	BEETLE^
a predaceous diving beetle	<i>Matus bicarinatus</i>	2000		SC/N	BEETLE^

Wolf River (CTH CCC to Lake Poygan)

Common Name	Scientific Name	Last Observation	US ESA Status	State Status	Group name
a riffle beetle	<i>Stenelmis antennalis</i>	1999		SC/N	BEETLE^
a riffle beetle	<i>Stenelmis bicarinata</i>	1999		SC/N	BEETLE^
a riffle beetle	<i>Stenelmis fuscata</i>	1999		SC/N	BEETLE^
a water scavenging beetle	<i>Enochrus consortus</i>	2000		SC/N	BEETLE^
diving beetle	<i>Ilybius ignarus</i>	2000		SC/N	BEETLE^
a creeping water bug	<i>Pelocoris femorata</i>	1999		SC/N	BUG^
a velvet waterbug	<i>Hebrus buenoi</i>	2000		SC/N	BUG^
a water measurer	<i>Hydrometra martini</i>	2000		SC/N	BUG^
a water scorpion	<i>Nepa apiculata</i>	2000		SC/N	BUG^
a water scorpion	<i>Ranatra nigra</i>	2000		SC/N	BUG^
a caddisfly	<i>Trianaodes nox</i>	2000		SC/N	CADDISFLY^
white river crayfish	<i>Procambarus acutus</i>	2000		SC/N	CRAYFISH
Palaemonetes kadiakensis	<i>Mississippi grass shrimp</i>	2001		SC/N	CRAYFISH
elegant spreadwing	<i>Lestes inaequalis</i>	2000		SC/N	DRAGONFLY^
elusive clubtail	<i>Stylurus notatus</i>	1999		SC/N	DRAGONFLY^
plains clubtail	<i>Gomphurus externus</i>	1999		SC/N	DRAGONFLY^
pygmy snaketail	<i>Ophiogomphus howei</i>	1999		THR	DRAGONFLY^
Stygian shadowfly	<i>Neurocordulia</i> <i>yamaskanensis</i>	1999		SC/N	DRAGONFLY^
greater redhorse	<i>Moxostoma valenciennesi</i>	2000		THR	FISH^
lake chubsucker	<i>Erimyzon sucetta</i>	1981		SC/N	FISH^
lake sturgeon	<i>Acipenser fulvescens</i>	2001		SC/H	FISH^
pugnose minnow	<i>Opsopoeodus emiliae</i>	2000		SC/N	FISH^
river redhorse	<i>Moxostoma carinatum</i>	2000		THR	FISH^
weed shiner	<i>Notropis texanus</i>	2001		SC/N	FISH^
western sand darter	<i>Etheostoma clarum</i>	2001		SC/N	FISH^
a caddisfly	<i>Hydropsyche bidens</i>	1999		SC/N	INSECT^
a water boatman	<i>Hesperocorixa semilucida</i>	2000		SC/N	INSECT^
a Heptageniid mayfly	<i>Pseudiron centralis</i>	1999		SC/N	MAYFLY^
a mayfly	<i>Baetisca obesa</i>	1999		SC/N	MAYFLY^
a primitive minnow mayfly	<i>Parametetus chelifer</i>	1993		SC/N	MAYFLY^
a small minnow mayfly	<i>Paracloeodes minutus</i>	1992		SC/N	MAYFLY^
a small minnow mayfly	<i>Plauditus cestus</i>	1999		SC/N	MAYFLY^
an Ephemerid mayfly	<i>Pentagenia vittigera</i>	1992		SC/N	MAYFLY^
Buckhorn	<i>Tritogonia verrucosa</i>	1995		THR	MUSSEL^
Elktoe	<i>Alasmidonta marginata</i>	1995		SC/H	MUSSEL^
round pigtoe	<i>Pleurobema sintoxia</i>	1995		SC/H	MUSSEL^
Salamander mussel	<i>Simpsonaias ambigua</i>	1989		THR	MUSSEL^
Snuffbox	<i>Epioblasma triquetra</i>	1995		END	MUSSEL^
wood turtle	<i>Clemmys insculpta</i>	2000		THR	TURTLE^

3. Lower Embarrass River Corridor

Ecological Landscape: Northern Lake Michigan Coastal and Central Lake Michigan Coastal

Town-Ranges: T22N-R 14-15E; T23-25N-R 15E; T26N-R 14-15E

River Miles: 55

Site Description

This priority stream segment includes the lower 55 miles of the Embarrass River corridor beginning at the dam in Pella and continuing downstream to New London where it joins the Wolf River. The Wolf River itself has about 30 unimpounded river-miles below the confluence of the Embarrass, which in total results in about 85 river miles of free flowing warm water stream. Land cover in the Embarrass watershed below Pella is mostly farmland with a significant amount of forest, especially along the river corridor. Below STH 156 the river begins to meander in a well defined floodplain. This section of stream is classified as a small river with warm water, high alkalinity, moderate to low gradient, with mixed surface and groundwater sources. The upper two-fifths of this segment (above STH 156) has low runoff and high groundwater input, while the lower three-fifths of this segment has high runoff and low groundwater input. Water is turbid and bottom substrates are sand, rock, and gravel upstream, and predominantly fine sand and silt in the lower portion.

Site Significance

This segment of river is similar to the lower Wolf River to which it is tributary in that it harbors an excellent diversity of aquatic animals that are generally restricted to large river habitats. These include 95 aquatic insects and crustaceans, 14 mussels, and 68 fish species. The area below the dam at Pella is significant in that it harbors one of the few likely viable populations of the globally rare snuffbox mussel. Just upstream of the impoundment at Pella (and this segment) there is very high macroinvertebrate diversity.

There is also an excellent diversity of Endangered, Threatened, and Special Concern species here including four beetles, two dragonflies, three fish, one caddisfly, two stoneflies, two mayflies, and three mussels. Six of these species are globally rare and three are state Endangered or Threatened.

This section of stream was identified by The Nature Conservancy as a site of ecoregional significance, meaning conservation activities will be initiated by The Nature Conservancy to ensure protection of the diversity of aquatic species found here. The segment was one of five such sites identified by The Nature Conservancy as aquatic conservation priorities within the Wolf River basin. These TNC Sites were considered the best example of that type within the ecological drainage unit. This was based on the large number of aquatic animals, especially rare species, found here. See Part 1 for a description of TNC's Ecoregional Planning Process (The Nature Conservancy, 2000).

Management Considerations

The effects of dam operations at Pella on rare species found up and down stream will need to be evaluated. It appears that this dam is a barrier to upstream movement of lake sturgeon and snuffbox mussels. The Embarrass just before it enters the impoundment (Pella Pond) has the highest macroinvertebrate site diversity found in the basin. Construction of the Pella Pond likely

altered the downstream extent of this rich fauna. Management options that address agricultural runoff and future development should be considered. Field surveyors noted turbidity, siltation, cropland runoff, and bank erosion as significant factors potentially affecting water quality at the 13 sites sampled (Appendix E.3).

Lower Embarrass River Corridor Aquatic Animal EO's

Embarrass River (Pella dam to mouth)

Common Name	Scientific Name	Last Observation	US ESA Status	State Status	Group name
a predaceous beetle	<i>Laccobius reflexipennis</i>	2000		SC/N	BEETLE
a riffle beetle	<i>Stenelmis bicarinata</i>	1999		SC/N	BEETLE^
a riffle beetle	<i>Stenelmis fuscata</i>	1999		SC/N	BEETLE^
a water scavenging beetle	<i>Sperchopsis tessellatus</i>	1999		SC/N	BEETLE^
elusive clubtail	<i>Stylurus notatus</i>	1999		SC/N	DRAGONFLY^
pygmy snaketail	<i>Ophiogomphus howei</i>	1992		THR	DRAGONFLY^
lake sturgeon	<i>Acipenser fulvescens</i>	1980		SC/H	FISH^
weed shiner	<i>Notropis texanus</i>	1979		SC/N	FISH^
western sand darter	<i>Etheostoma clarum</i>	1999		SC/N	FISH^
a caddisfly	<i>Hydropsyche bidens</i>	1999		SC/N	INSECT^
a Perlid stonefly	<i>Isoperla bilineata</i>	1999		SC/N	INSECT^
a Perlid stonefly	<i>Isoperla marlynia</i>	1999		SC/N	INSECT^
a Heptageniid mayfly	<i>Pseudiron centralis</i>	1999		SC/N	MAYFLY^
a mayfly	<i>Baetisca obesa</i>	1999		SC/N	MAYFLY^
Elktoe	<i>Alasmidonta marginata</i>	1995		SC/H	MUSSEL^
salamander mussel	<i>Simpsonaias ambigua</i>	1988		THR	MUSSEL^
Snuffbox	<i>Epioblasma triquetra</i>	1995		END	MUSSEL^

4. Little Wolf River Corridor

Ecological Landscapes: Central Lake Michigan Coastal and Southeastern Glacial Plain
Town-Ranges: T22N-R 13-14E; T23N-R 13E
River Miles: about 15

Site Description

This priority stream segment begins with the North Branch of the Little Wolf at the dam in Manawa and continues as the mainstem of the Little Wolf below the confluence of the South Branch of the Little Wolf River until it joins the Wolf River. This comprises approximately 15 river miles. Below the confluence, the Wolf River has approximately 25 unimpounded river-miles which, in combination with the Little Wolf, creates a relatively long free flowing warm water stream. Land cover in the Little Wolf watershed below Manawa is mostly farmland with frequent small forests. Much of the riverbank abuts farmland directly, except for the last few miles where extensive floodplain forest predominates. Overall this is a slow, clear, hard warm water stream with some sections of moderate current and rapids. Upstream sections of both branches harbor cool to coldwater species.

Site Significance

This segment of river is similar to the lower Wolf River to which it is tributary in that it harbors a good number of rare aquatic animals that are generally restricted to large river habitats. These include 69 aquatic insects and arthropods, two mussels, and 49 fish species. There also are stretches of fast water and rapids - uncommon habitat in the lower Wolf Basin.

There is also an excellent diversity of Endangered, Threatened, and Special Concern species here including one beetle, four dragonflies, one mayfly, three fish, and one mussel. Four of these species are globally rare, and two are state Endangered or Threatened.

Management Considerations

Field surveyors noted several factors potentially affecting water quality including exotics, cropland runoff, and bank erosion. Septic and urban impacts were noted at few sites. See Appendix E.3 for a full list. Management options that address agricultural runoff and future development should be considered. The effects of dam operations at Manawa on rare species found downstream will need to be evaluated.

Little Wolf River Corridor Aquatic Animal EO's

Little Wolf River (Manawa dam to mouth)

Common Name	Scientific Name	Last Observation	US ESA Status	State Status	Group name
a riffle beetle	<i>Stenelmis bicarinata</i>	1999		SC/N	BEETLE^
dark rubyspot	<i>Hetaerina titia</i>	1999		SC/N	DRAGONFLY^
pygmy snaketail	<i>Ophiogomphus howei</i>	1999		THR	DRAGONFLY^
skillet clubtail	<i>Gomphurus ventricosus</i>	1999		SC/N	DRAGONFLY^
Stygian shadowfly	<i>Neurocordulia yamaskanensis</i>	1999		SC/N	DRAGONFLY^
greater redhorse	<i>Moxostoma valenciennesi</i>	1994		THR	FISH^
lake sturgeon	<i>Acipenser fulvescens</i>	1991		SC/H	FISH^
western sand darter	<i>Etheostoma clarum</i>	1979		SC/N	FISH^

Little Wolf River (Manawa dam to mouth)

Common Name	Scientific Name	Last Observation	US ESA Status	State Status	Group name
a Caenid mayfly	<i>Brachycercus prudens</i>	1999		SC/N	MAYFLY^
snuffbox	<i>Epioblasma triquetra</i>	1988		END	MUSSEL^
